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COMMONWEALTH PHYTOPATHOLOGICAL NEWS

A QUARTERLY REVIEW OF NEWS AND VIEWS ISSUED BY THE COMMONWEALTH MYCOLOGICAL INSTITUTE, KEW, SURREY

WORLD USAGE OF FUNGICIDES

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Introduction

Plant pathologists during the course of their work recommend farmers to use fungicides and seed dressings and these recommendations have led to the growth of a substantial chemical industry for the manufacture of these materials. It is the purpose of the author to discuss fungicide consumption in world agriculture and to consider the major diseases involved.

Fungicide Consumption

The most comprehensive statistics on the quantity of fungicides used annually for the treatment of agricultural crops are those published in the Annual Production Yearbook of the Food and Agriculture Organisation of the United Nations. In considering the figures it should be remembered that there are serious difficulties involved in assembling accurate world statistics. Even with this qualification, however, the magnitude of the fungicide industry and the relative importance of the different compounds are clearly indicated.

In the table below (1) the different inorganic compounds have been converted to the weight of the most frequently used chemical and the organic products to the weight of the active ingredient. The figures exclude sulphur* used in lime sulphur, but include all the organic fungicides as it has not been possible to separate the agricultural and horticultural uses.

WEIGHT AND VALUE OF FUNGICIDE RAW MATERIALS, 1958

Raw material	Weight in metric tons	Price per ton £	Value in £
*Sulphur	275,000	10	2,750,000
Copper as $CuSO_4 . 5H_2O$	224,000	100	22,400,000
Mercury as $C_6H_5H\ HgOOCH_3$	500	3,000	1,500,000
Organic compounds	12,000	—	5,400,000

All the raw materials, with the exception of copper sulphate, need further processing. With the basic ingredients costing £32,050,000, the wholesale

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value of agricultural fungicides is likely to be not less than £40,000,000 per annum and is probably nearer £50,000,000, when allowances are made for the inevitable omissions from world statistics.

It is one of the functions of the pesticide industry to prepare the raw materials in a form suitable for use by the farmer, a process usually called formulation. Most of the sulphur used in agriculture is in dust form. Accordingly, it has to be finely ground and an anti-caking material added to prevent the electrostatically charged particles adhering. The preparation of the copper is simple as probably about 80 per cent. of the copper used as a fungicide is sold as copper sulphate for the preparation of Bordeaux mixture. The fixed coppers such as copper oxychloride, copper oxysulphate, and cuprous oxide have grown in importance since their introduction in the 1930's, as their preparation for use is very much simpler than that of Bordeaux mixture.

The main use of mercury as a fungicide is for the manufacture of organo mercurial compounds for seed dressings. Many different chemicals have been developed for this purpose since phenyl mercury acetate was first used over forty years ago. These compounds are very much more active biologically than the inorganic salts, and, consequently, reduce the quantity of metallic mercury required. Most seed dressings are formulated as powders, the remainder being liquids and wettable powders used as slurries.

The formulation of the organic fungicide compounds calls for considerable skill on the part of the chemist. Particle size plays an important part in the efficiency of most of the organic compounds and must be carefully controlled.

Major World Diseases

Existing statistics are insufficient to make an accurate assessment of the quantities of fungicide used for the control of each of the major plant diseases, but an indication of the importance of the various diseases is given by the consumption of fungicides in the various countries.

Viticulture is undoubtedly the world's largest consumer of fungicides, using most of the sulphur and about half the copper employed for this purpose. Sulphur is used for the control of powdery mildew of vines (Uncinula necator). It is applied as a dust, two or three applications being sufficient to control the disease under normal conditions.

For many years Bordeaux mixture was the only fungicide which gave satisfactory control of vine downy mildew (Plasmopara viticola). Normally about six rounds of a 1 per cent. to 2 per cent. Bordeaux mixture spray are applied each season, starting about the middle of May and ending in July. In France, a combined fungicide containing 37 per cent. of copper oxychloride and 17 per cent. of zineb is becoming increasingly popular, while in Italy a straight zineb spray programme is being extensively used, which would suggest that the long reign of Bordeaux mixture is gradually ending.

Potatoes are probably the next crop in order of fungicidal importance due to their susceptibility to potato blight (Phytophthora infestans). Bordeaux mixture was being used for control shortly after its introduction for the control of vine downy mildew. The number of sprays required naturally varies with the incidence of the disease, but normally 3-4 sprays are adequate. Bordeaux mixture has, however, been largely replaced by copper oxychloride in the U.K. and in their turn the organic fungicides, particularly zineb, are becoming increasingly important.

Two diseases of plantation crops, namely, banana leaf spot (Mycosphaerella musicola) and blister blight of tea (Exobasidium vexans), require substantial quantities of copper fungicides for their control. Banana leaf spot first appeared in the New World in 1933 and the damage caused was so serious that measures had to be taken rapidly for its control. The original spray programmes were based on Bordeaux mixture, but as with other crops this has been partly replaced by fixed coppers, particularly those based on cuprous oxide and copper oxysulphate.

Banana leaf spot control is, however, particularly interesting as it is one of the few diseases against which refined mineral oils at rates of 1 to 2 gallons per acre appear to act as fungicides on their own account. The evolution of the spray programme is still proceeding and it would appear probable that control will eventually be based on mixtures of mineral oil and copper applied from the air.

Blister blight of tea, which was known in Assam for many years, did not become a disease of economic importance until it appeared in Ceylon in 1946. As, however, the disease had already been studied, control measures were available. The standard programme for tea plantations in Ceylon is to spray the tea with either copper oxychloride or cuprous oxide at the rate of 6 oz. per 15 gallons of water per acre. The treatment is at frequent intervals during recovery from pruning and after each plucking; thus 15 or more applications are made during a year.

There are, in addition, other smaller outlets for copper fungicides on a variety of crops such as their use against coffee leaf rust (Hemileia vastatrix), cocoa black pod (Phytophthora palmivora), and citrus black spot (Phoma citricarpa), which should perhaps be included in the list.

The earliest fungicidal seed dressings were based on copper compounds, but the introduction of organo mercury compounds in 1915 marked a turning point. Since that time a series of increasingly effective compounds has been introduced until today one gram of mercury in organic combination is sufficient to treat the seed for an acre of wheat and will prevent the development of any bunt. Powders are the most popular form of seed dressing, but liquid seed dressings are widely used in some countries such as Sweden and North America.

The mercurial seed dressings control a wide variety of diseases, among the more important being bunt or stinking smut of wheat (Tilletia caries), covered smut of barley (Ustilago hordei), leaf stripe of oats (Helminthosporium avenae), and bacterial blight or blackarm of cotton (Xanthomonas malvacearum).

Seed dressings based on organic compounds are also used, particularly on seeds which require protection against soil-borne fungi. For example, thiram seed dressings are widely used for the treatment of peas, groundnuts, and maize, and on sorghum for the control of smuts (Sphacelotheca spp.).

Mention also must be made of the very interesting development in Japan of organo mercurial dusts for the control of rice blast (Piricularia oryzae). This disease is widespread throughout the rice growing areas of the world, but only reaches damaging levels on a limited acreage. In Japan, the disease is kept in check by two to three applications during the season with organo mercurial dusts containing 0.15 to 0.25 per cent. of mercury.

The organic fungicides based on compounds such as ziram, ferbam, thiram, captan, zineb, and maneb are steadily making headway, mainly replacing copper fungicides. They have the great advantage of negligible phytotoxicity on most crops so that they are ideal for repeated applications at short intervals; and on crops, such as potatoes, which are somewhat liable to copper injury.

Future Prospects

The organic fungicides were first introduced in the 1930's and since then they have steadily increased both in number and volume. The current search in government and commercial research stations throughout the world for new and more effective compounds must lead to further improvements in existing methods of control. It should not be forgotten that there are important diseases such as the cereal rusts for which there are as yet no economic chemical methods of control.

REFERENCES

1. Gayner, F.C.H. Fungicide usage in World Agriculture. SOC. CHEM. INDUSTRY MONOGRAPH. "Fungicides in Agriculture and Horticulture" (in the press).

Overheard in Ferry Lane

Party Leader — "That is the Commonwealth Memorial Institute"

The inmates reserve comment.

FROM NEAR AND FAR

It is proposed to hold an International Symposium organized by the Faculty of Forestry of the Humboldt University, Berlin, at Eberswalde, on wood destruction by fungi in May 1962. The programme will include problems of taxonomy, ecology of wood destroying fungi, physiology and bio-chemistry of the fungi, chemical and physical changes of wood structure caused by fungi, and antibiosis and action of toxins. It is not proposed to discuss technical problems of wood preservation. Further particulars from Professors W. Gillwald or H. Lyr at Institut für Forstbotanik, Eberswalde (DDR), Germany.

Peronospora tabacina has now been reported for the first time from eastern Macedonia and Thrace in Greece. It has caused severe damage to crops in Yugoslavia and Albania and now threatens heavy losses to the Greek tobacco crop. Troops and police have been engaged in day and night spraying with fungicides in attempts to bring the outbreak under control. Zineb at 0.3 per cent. is the most generally used spray both in seed-beds and, where necessary, in the fields. In Yugoslavia, treatment is carried out through the whole territory irrespective of the presence of the disease.

The Government of Ghana has issued a letter to the press stating inter alia that it has decided to establish a University of Accra and a University of Science and Technology, Kumasi, to replace the University College of Ghana and the Kumasi College of Technology, which will cease to exist. It is also proposed to set up a university college at Cape Coast. It is understood that the new independent university will receive its charter on 1 October 1961 and will assume the liabilities and contracts of the university college.

An H.G. Wells Society has been formed in the U.K. to promote an active interest in the life and work of this remarkable man and to encourage an appreciation of the impact of his thought on modern society. Hon. Secretary is J.R. Hammond, 39, Rugley Road, West Bridgford, Nottingham.

Federal expenditure on scientific research and development in the United States during 1960 was $7,700 million according to a National Science Foundation analysis and is expected to increase to $8,200 million in 1961. About 90 per cent. was for defense and aeronautics and space research.

Publications of Interest

A new journal THE AUSTRALIAN SCIENTIST appeared in February 1961 (subscription in Commonwealth countries £3.12.6 a year), covering the main scientific activities of the continent. It is proposed to include letters to the editor as soon as practicable.

E.W. Momber has published a useful analysis of systems of peasant agriculture in the tropics which should be read by all plant pathologists dealing with tropical crops. It appeared in RURAL LIFE, 6, 1, 1961.

As an example of "putting it over to the public", the new booklet COMBINING FOR RESEARCH issued by the DSIR to publicize the work of their Research Associations is worthy of close study.

THE ECOLOGY OF SOIL FUNGI, the report of an international symposium (Liverpool: The University Press, 1960. 42s. 6d.), reviews the present knowledge of the soil mycoflora as well as techniques, which are of such great importance for future advances.

The annual report for 1959-60 of the Cawthron Institute, New Zealand contains papers on investigations into bitter pit of apple and Phytophthora disease of hops.

THE STATUS AND DEVELOPMENT OF ELM DISEASE IN BRITAIN, Bulletin 33 of the Forestry Commission [London. H.M. Stationery Office, 1960. Price 10s. net.]. This is a useful survey by T.R. Peace of the work with which he has been principally connected over the last 30 years. It is illustrated by 76 excellent plates.

SECTION CUTTING IN MICROSCOPY (H.F. Steedman, 192 pp., 71 figs. Oxford. Blackwell Scientific Publications. 21s.) An up to date guide of much value to all research workers and teachers. Includes both new and old and well tried techniques.

ELECTRON MICROSCOPY (E.H. Mercer and M.S.C. Birbeck. 84 pp. 4 figs. Oxford. Blackwell's Scientific Publications. 10s. 6d.) You do not need to own an electron microscope to find this book useful for techniques are described in detail so that the inexperienced may prepare specimens suitable for immediate examination in the microscope.

DESIGN OF RESEARCH LABORATORIES

A report of a study carried out by the Division for Architectural Studies of the Nuffield Foundation was published in April for the Nuffield Foundation by the Oxford University Press, price 45s.

This study was initiated by the Nuffield Foundation in 1954 at the request of the Agricultural Research Council, who also gave financial support to the project. The investigation was carried out by the Nuffield Foundation Division for Architectural Studies (Director: R. Llewelyn Davies, now Professor of Architecture in the University of London).

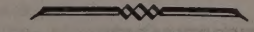
The work carried out was of two kinds, original investigations (space and service requirements, design in relation to lighting and the analysis of building costs), and analytical studies of existing data which may reasonably be applied to laboratories. The latter include noise reduction, vibration, fire protection, the design of special rooms, materials and finishes.

The detailed original investigation of the space and services required in a large range of scientific disciplines was carried out by means of a survey which lasted eighteen months. The Agricultural Research Council gave the team access to all its research establishments, and cross checks were made in industrial research laboratories to test the validity of the work for general application to non-government laboratories.

The book contains a series of tables which may form the basis for the design of laboratories. The suggestion is made that a unit of laboratory space may be evolved which would provide great adaptability whilst maintaining strict economy of space and servicing. It is recommended that rooms should be of greater depth from window to rear wall than has been common hitherto. This demands a new conception of lighting, combining natural and artificial light sources in multi-storey buildings and using supplementary daylight of a special kind in single-storey buildings.

The building costs of a number of recent laboratories are analysed, showing the proportions of total cost allotted to structure and mechanical services.

All plant pathologists can benefit from a close perusal of this very interesting report which is beautifully printed and illustrated.



IMPORTANT NAME CHANGE IN HERBARIUM

The Herbarium has now adopted the name Puccinia penicillariae Speg. (1914) as the earliest legitimate name for P. penniseti Zimm. (1904) non Barclay (1891).

Reference Map No. 225.

SOCIETY FOR ECONOMIC BOTANY

The Society for Economic Botany, an international scientific organization, invites your participation and welcomes your membership.

The objective of the Society is the promotion and stimulation of scientific studies of plants useful to man. The methods of achieving this objective are annual meetings, technical conferences, and publication of ECONOMIC BOTANY, the official journal of the Society.

Present members in the Society for Economic Botany, represent nearly all scientific disciplines: anthropology, pharmacology, geography, agriculture, chemistry, physics, and all fields of botanical science. The only prerequisite for membership is an interest in the study of the past, present, or future use of plants to man.

Membership dues are $7.50 (U.S.) annually, and includes one year's subscription to ECONOMIC BOTANY. ECONOMIC BOTANY publishes monographs, review articles, and original manuscripts on all subjects relating to the use of plants and plant products.

Inquiries and dues can be sent directly to the Treasurer, Richard M. Klein, The New York Botanical Garden, Bronx Park, New York 58, N.Y. (U.S.A.).

SOCIETIES OF INTEREST TO PLANT PATHOLOGISTS

ASSOCIATION OF APPLIED BIOLOGISTS
General Secretary: Dr. L. Broadbent, Glasshouse Crops Research Institute, Rustington, Littlehampton, Sussex.

BOTANICAL SOCIETY OF THE BRITISH ISLES
General Secretary: Dr. J.G. Dony, 41 Somerset Avenue, Luton, Beds.

BRITISH MYCOLOGICAL SOCIETY
Secretary: Dr. J.G. Manners, Department of Botany, The University, Southampton.

GENETICAL SOCIETY
Secretaries: Dr. S.D. Lawler, Royal Marsden Hospital, London, S.W.3. Dr. R: Riley, Plant Breeding Institute, Trumpington, Cambridge.

LINNEAN SOCIETY
Botanical Secretary: Dr. C.R. Metcalfe, Royal Botanic Gardens, Kew.

ROYAL ENTOMOLOGICAL SOCIETY OF LONDON
Secretary: Dr. Paul Freeman, Royal Entomological Society, 41 Queen's Gate, London, S.W.7.

ROYAL HORTICULTURAL SOCIETY
Secretary: A. Simmonds, Esq., Royal Horticultural Society, Vincent Square, London, S.W.1.

SOCIETY FOR APPLIED BACTERIOLOGY
Secretary: Dr. Ella Barnes, Low Temperature Research Station, Downing Street, Cambridge.

SOCIETY FOR GENERAL MICROBIOLOGY
General Secretary: Dr. S.T. Cowan, National Collection of Type Cultures, Central Public Health Laboratories, Colindale Avenue, London, N.W.9.

SYSTEMATICS ASSOCIATION
Secretary: R.D. Meikle, Esq., Royal Botanic Gardens, Kew, Surrey.

IMPORTANT NOTICE TO READERS

It was announced in the January issue that the COMMONWEALTH PHYTOPATHOLOGICAL NEWS would cease publication with the October issue. This matter is still under consideration by the Executive Council of the Commonwealth Agricultural Bureaux and Subscribers may therefore, if they wish, continue to subscribe beyond October next. The Council's final decision will be announced in this Journal in due course.

TECHNICAL TRAINING WEEK

29 May - 4 June 1961

In connexion with the programme arranged by the Boroughs of Richmond and Barnes for the Commonwealth Technical Training Week the Institute advertised its activities at an Exhibition 'Training Today for To-morrow' at the Territorial Army Drill Hall in Richmond, and on Wednesday 31 May held an Open Day at C. M. I.

Photo by Richmond & Twickenham Times

In the morning parties of senior pupils from Gainsborough School, Richmond, Lonsdale School, Barnes, and Shene Grammar School were addressed by the director and given conducted tours of the Institute. In the afternoon a party from the Chiswick Technical College, officials of various organizations, such as Youth Employment Bureaux, and members of the general public made less formal visits.

Throughout the day small exhibits in the offices, laboratories, and the photographic section were on view with, as far as possible, the normal work of the Institute in progress as a background.

A good deal of interest was shown by the scholars, and particularly by members of the teaching profession who accompanied them, in the prospects of employment in the kind of work done by C. M. I.

Fertilizer Salesman — "Just sprinkle on and jump clear"

PERSONAL NEWS

C. M. I. News

The Director in company with Mr. E.O. Pearson, Director, Commonwealth Institute of Entomology, will attend the 6th meeting of the Inter African Phytosanitary Commission to be held in Ibadan, Nigeria, in October 1961. It is also proposed that they should visit research centres in Nigeria and Ghana.

Dr. B.E.J. Wheeler of the Pool of Plant Pathologists has resigned. It is understood that he is taking up an academic post in U.K.

R. Leach, who is well known for his work on Armillaria mellea and on banana leaf spot, has joined the Pool.

Visitors

Among overseas visitors have been: Pierre Baudin, Madagascar; Dele Esuroso, Nigeria; Dr. H.M. Good, Canada; M. Hoarau, Reunion; Teresa Icochea, Peru; Dr. G.B. Kendrick, U.S.A.; E.A. Manuel, Bermuda; Dr. A.R. Mohajir, Pakistan; E. Prinithalingam, Ceylon; B. Simon, Tanganyika; J.H. Simons, Nigeria, and D.G. Thomas, Uganda.

Mr. Simons spent some weeks studying in the herbarium.

The 4th annual visit to C.M.I. by students of Imperial College, London, on 12 May, led by Dr. R.K.S. Wood

Appointments, Promotions, Retirements, etc.

The Overseas Division of the Colonial Office notify the following appointments: A.R. Melville, director of agriculture, Kenya; A. North Coombes, director of agriculture, Mauritius; I. Pattinson, Pest Control Officer, Gambia; R.A. Bull, plant physiologist, Tanganyika.

Professor R.T. Leiper, who retired in 1958 after 30 years as director of the Commonwealth Bureau of Helminthology, has been appointed consultant director to the Bureau.

Sir Harold Roxbee Cox has been appointed chairman of the Council for Scientific and Industrial Research as from 1 October 1961 to follow Sir Harry Jephcott.

(continued on p. 47)

OVERSEAS NEWS

CANADA

REORGANIZATION OF CANADIAN GOVERNMENT FOREST PATHOLOGY

The programme of forest disease and insect research and surveys in the Federal Government of Canada is the responsibility of the Forest Entomology and Pathology Branch (formerly the Forest Biology Division, Department of Agriculture) of the Department of Forestry.

Forest pathology and forest entomology are the two major scientific elements comprising the Branch. The Branch Headquarters in Ottawa consists of three principal officers, a Director and two Associate Directors. One Associate Director of the Branch is responsible for the Canada-wide direction of the programme of research and surveys in forest pathology. Some 60 forest pathologists assisted by approximately 100 laboratory and field technicians are distributed throughout Canada at seven regional laboratories. The locations of these laboratories with the names of the regional head pathologists are as follows: Victoria, British Columbia (Dr. R.E. Foster); Calgary, Alberta (Dr. G.P. Thomas); Saskatoon, Saskatchewan (Dr. C.G. Riley); Maple, Ontario (Dr. L.T. White); Sillery, Quebec (Dr. Rene Pomerleau); and Corner Brook, Newfoundland (to be appointed).

Within the Forest Entomology and Pathology Branch there are close working relationships between the pathology and entomology groups, with a high degree of integration and interdependence of personnel, surveys and research programmes, and facilities. For example, in the Forest Insect and Disease Survey programme a number of additional research officers coordinate insect and disease data regionally and nationally, and some 75 forest technician rangers are responsible for surveys and collection activities on both diseases and insects. There are joint facilities and personnel also for photography, library, biometry, administration, and other services.

Close ties are maintained with other Federal Government agencies particularly with the Programme Directorate and the Plant Research Institute of the Department of Agriculture for liaison and co-ordination in areas of mutual research interest.

Associate Director (Forest Pathology), V.J. Nordin
Forest Entomology & Pathology Branch,
Department of Forestry,
Ottawa, Ontario.

News Items

Dr. Robert A. Shoemaker, mycologist at the Plant Research Institute, Ottawa, is spending a year on transfer of work at the Swiss Federal Institute of Technology at Zurich, Switzerland. While in Zurich he will work in the laboratory of Dr. Emil Müller on Pyrenomycetes and their conidial state connections.

Dr. Harvey C. Smith, head of the Plant Pathology Laboratory, Lincoln, New Zealand, is at present working in the laboratory of Dr. John T. Slykhuis, Plant Research Institute, Ottawa. Dr. Smith holds a National Research Council Post-doctorate Fellowship for one year and during its tenure will be studying strains of the barley yellow dwarf virus in relation to epidemiology and breeding for host resistance.

Dr. Louis J. Coulombe, plant pathologist, has left the staff of Canada Department of Agriculture at Ste. Anne de la Pocatiere to accept employment with Niagara Brand Chemicals.

Dr. Maria E. Pantidou, mycologist, Plant Research Institute, Ottawa, is on leave of absence for six months during which time she will be employed at the Institut Phytopathologique Benaki, in Athens, Greece. Miss Pantidou will be

supervising the building up of a mycological herbarium and culture collection at that institution.

Dr. Maurice F. Welsh, head, Plant Pathology Section, Canada Agriculture Research Station, Summerland, B.C., is on a year's transfer of work at the Research Station, East Malling, Kent, England. He will continue his studies on virus diseases of fruit trees.

Dr. R.A. Ludwig, director, Plant Research Institute is visiting research stations in the United Kingdom and continental Europe. He will return to Ottawa late in July.

Professor W.E. Sackston of Macdonald College is at present visiting research establishments in Europe and the U.S.S.R. His trip is sponsored by the National Research Council of Canada and the Academy of Sciences of the U.S.S.R. as part of the exchange programme for scientists promoted by the two organizations.

Kenneth A. Harrison, plant pathologist at the Canada Agriculture Research Station, Kentville, N.S., has returned from a three months appointment as visiting curator in the Mycological Herbarium of the University of Michigan. While in Ann Arbor, Mr. Harrison was engaged in a study of the Hydnaceae.

NEW SOUTH WALES

Stunting of Citrus

In N.S.W. citrus trees on Poncirus trifoliata stock are sometimes affected with a stunting condition which is not associated with manifestations of the scaly butt (exocortis) virus. Dr. Fraser reports that experiments carried out as part of the programme of the Citrus Improvement Committee of the N.S.W. Department of Agriculture to determine whether this stunting is transmissible are now yielding positive results.

Trees of a vigorous nucellar strain of navel orange were inoculated five years ago with buds from eight selections of variously stunted trees of Washington navel orange and Marsh grapefruit. During the past year the growth rates of inoculated trees have been depressed to varying degrees depending on the source of inoculum. The greatest effect has been obtained with inoculum of stunted Marsh grapefruit. Nucellar navel oranges inoculated with this selection are now about two-thirds the size of uninoculated controls, and in addition are of poor colour and have suffered considerable defoliation. Not all stunting on trifoliata is due to a transmissible factor, however, since inoculation with budwood of a very stunted Valencia orange has failed to induce stunting in nucellar navel orange trees, and trees propagated from this Valencia have grown well, with no signs of stunting. This type of stunting may possibly result from the accidental use of non-nucellar stocks, as is known to occur with sour orange stock.

Decline of Kikuyu Grass

Dr. P.G. Valder reports that in recent years a curious disease of Kikuyu grass (Pennisetum clandestinum) has become conspicuous on the north coast of N.S.W. and is causing some farmers concern, since it is killing areas of this valuable pasture grass.

The disease first manifests itself as a small yellow patch. This gradually enlarges and the centre dies. The yellow border usually continues advancing into the pasture, often in an almost perfect circle, with the grass dying behind it. This condition seems most active in the late summer and as a result of the coalescence of numerous affected patches considerable areas may be killed.

No evidence has so far been found that any fungus, bacterium, insect, mite, or nematode is responsible. So far no attempt has been made to test the hypo-

thesis that a virus infection is responsible but the fact that the disease moves out on such a well defined front is most baffling, in view of the fact that no evidence can be found that it is a disease of the 'fairy ring' type and no other plants have been observed to be affected.

Dr. Valder would be very interested to hear from anyone who has any experience of such a disease in kikuyu or, for that matter, any other plant.

C. J. Magee

CEYLON

BACTERIAL LEAF STRIPE DISEASE OF GUATEMALA GRASS (Tripsacum laxum Nash)

Guatemala grass (Tripsacum laxum Nash) was introduced to Ceylon by the Department of Agriculture as early as 1922 as a fodder crop. In 1934, it was planted at the Tea Research Institute and in 1936 it was used to plant up bare patches in tea fields caused by Poria root disease. In 1949, large scale planting of Guatemala grass for the purpose of soil rehabilitation started in areas where tea had been uprooted for replanting with clonal tea.

No serious diseases of Guatemala grass have been reported so far from Ceylon, but recently a necrosis of leaves of Guatemala grass, occurring in the form of stripes along the border and inside the leaf, has been identified as being due to bacterial attack. Its occurrence is limited to up-country estates (3,000-6,000 ft. altitude).

Symptoms

The first symptoms appear along the border near the tip of the leaf or at any place on the leaf which has been damaged. The necrotic stripe develops downward along the leaf between the border and the midrib. Between healthy and dead tissue a yellow zone is visible. This yellow zone shows the presence of bacteria under the microscope. The bacteria are contained in the vessels, oozing out from them in water at a cut surface. The disease is so far confined to the leaves. No infection of stems has been observed, in contrast to the bacterial stripe disease of sugar cane caused by Xanthomonas vasculorum which does penetrate the stems.

Bacterial stripe of Guatemala grass

Contributory Conditions

To a certain extent the severity of the attack seems to be influenced by the nitrogen nutrition of the plant. Nitrogen-starved plants show less severe attack. This might be an effect of a difference in nitrogen-potash balance, potash deficient plants being more susceptible. The spread of the infection is kept down by the periodical lopping of the grass.

All Guatemala grass on tea estates belongs to the same species and the same clone and therefore no differences in susceptibility between types have been observed.

Cause

The bacterium causing this stripe disease

has been identified by the Commonwealth Mycological Institute as a Xanthomonas species, although a few atypical characteristics have been observed by Dr. Hayward (letter of 17.2.61).

Plant Pathologist, D. Mulder
Tea Research Institute of Ceylon.

[●● Dr. W.J. Dowson informs me that he has carried out inoculations by needle puncture into the spindles of maize seedlings of two varieties, one from Uganda the other from Nigeria, using as inoculum Dr. Mulder's Xanthomonas sp. from Tripsacum laxum. The leaves of both varieties became streaked and the plants eventually wilted and collapsed. The effect was comparable to that obtained following inoculation of maize with cultures of Xanthomonas vasculorum. J.C.F.H.]

GHANA

GALLS OF COCOA — A CORRECTION

We would like to prevent a misunderstanding which might arise from reading the discussion on papers relating to 'cushion gall' disease of cocoa occurring in South and Central America, given at the Eighth Inter-American Cacao Conference held in Trinidad in June 1960 (3).

At this time the possibility that the similar gall disease of cocoa in Ghana (1, 2) might result from bacterial infection was being investigated in Ghana and England. Dr. W.J. Dowson at Cambridge and Dr. A.C. Hayward at the Commonwealth Mycological Institute had isolated several bacteria, including cultures resembling Agrobacterium tumefaciens (Smith & Townsend) Conn., from gall material received from Ghana. These isolates were tested for infectivity by inoculating cocoa half-beans (1, 2), but with negative results. However, spherical tumours were readily obtained on both cocoa cotyledons and seedlings after inocu-

Fig. 1. 'Crown gall' tumour on cocoa cotyledon after inoculation with A. tumefaciens.

Fig. 2. Galls from cotyledon axillary bud after inoculating cocoa half-beans with a gall isolate of Calonectria rigidiuscula.

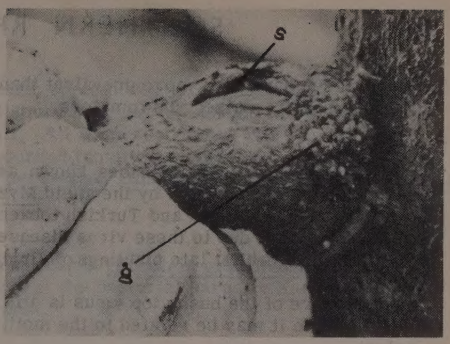


Fig. 3. Gall (1 cm. diameter) developing on a pod stalk 4 months after inoculation with C. rigidiuscula. g = gall, s= point of inoculation.

lating each with an authentic culture of A. tumefaciens (N.C.P.P.B.* No. 397). These tumours were similar in appearance (fig. 1) to the 'crown galls' induced by this pathogen on other hosts and were morphologically quite distinct from the bud proliferation produced on seedlings by inoculating half-beans with cocoa gall extracts.

Dr. Tinsley represented W.A.C.R.I. at the Eighth Inter-American Cacao Conference and in the discussion on 'cushion gall' disease drew the attention of delegates to our results with A. tumefaciens. However, in the brief meeting with Dr. Tinsley before he left for Trinidad we were not then in a position to draw a distinction between the tumours obtained with the authentic culture of A. tumefaciens and the symptoms of the gall disorder under investigation. We would emphasize here that the latter disease has not been reproduced by inoculating cocoa with A. tumefaciens.

Figures 2 and 3 show galls formed on seedlings and a tree after inoculating the seed and pod stalk, respectively, with one isolate of the Calonectria pathogen. In both cases the bud proliferation symptoms are the same as those produced using gall extracts (1, 2).

The gall disease in Ghana is now known to be caused by Calonectria rigidiuscula (Berk. & Br.) Sacc. and our results will be reported in detail elsewhere.

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SOUTHERN RHODESIA

Virus diseases have been more prevalent than usual in several important crops including tobacco, maize, and tomatoes.

Tobacco

The closely related virus diseases known as rosette and bushy top, both of which are freely transmitted by the aphid Myzus persicae, developed extensively among Virginia flue-cured and Turkish tobacco crops during the 1960/61 season. Very severe losses due to these virus diseases were sustained by growers of Turkish tobacco, whilst late plantings of Virginia type tobacco were also heavily attacked.

The nature of the bushy top virus is still uncertain but preliminary investigations indicate it may be related to the mottle component of the rosette virus complex.

No serious outbreaks of other tobacco diseases occurred during the season under review. Anthracnose, due to Colletotrichum tabacum, which was at one time of major importance in tobacco seedbeds, has now largely been brought under control by rigorous hygiene and the proper application of suitable fungicides coupled with the almost general use of certified seed.

Maize

At one time maize streak virus was regarded as being peculiarly a disease of low altitude crops. Recently it has become more prevalent throughout the principal maize growing districts of the high veld. This trend is probably associated with the more frequent growing of early irrigated maize for forage and "green mealies" since many of these out-of-season crops are severely infected by streak.

Tomato

Bacterial canker due to Corynebacterium michiganense was discovered for the first time in Southern Rhodesia during October 1960, in three commercial plantings near Salisbury. Within two months the disease was reported from practically all areas of the country. The amount of damage caused varied considerably, some growers losing 50 per cent. or more of their crops.

Attempts to trace the origin of this widespread infection have been unsuccessful and it seems possible that the disease had been present for some time but was overlooked by growers.

More recently, many tomato crops have been seriously affected by a virus disease which frequently causes severe fruit distortion as well as a stunting of the plant. This disease appeared quite suddenly in widely separated districts. It is sap transmissible and, from inoculation tests with Nicotiana species, is thought to be a strain of tomato streak virus.

Tomato spotted wilt virus (kromnek) was also recorded from a tomato crop at Umtali.

Potato

Virus Y was more widespread than usual in commercial crops and was especially severe among experimental plantings in Salisbury. Late blight did not appear in the main summer crop until early January, but thereafter spread rapidly causing heavier losses than in the three previous seasons.

Black-leg (Erwinia carotovora), which is normally confined to late-planted summer and early irrigation crops grown from imported seed, appears to have established itself on one farm in the Eastern Districts where seed potatoes are grown on lands at 7,000 ft. altitude. Elsewhere throughout the main potato growing districts this bacterial pathogen is unable to survive from one season to the next in the soil.

Apple

Scab, due to the fungus Venturia inaequalis, was recorded for the first time in Southern Rhodesia during November 1960 on eight year old White Winter Permain apple trees at Melsetter. Adjoining trees of other varieties were not infected. Subsequently, the disease was found on apple trees in two private gardens in

Salisbury.

Kromnek

Localised outbreaks of kromnek (tomato spotted wilt virus) have been found in private gardens in Bulawayo and Salisbury recently in addition to the one case on tomatoes reported above from Umtali. All were associated with typical virus infection in dahlias. Other hosts recorded from these outbreaks included Capsicum sp., Viola odorata, Physalis peruviana, Dimorphotheca sinuata, and Ammi majus var. glaucifolium.

Wheat

Studies on the typing of wheat stem rust races (Puccinia graminis tritici) have been complicated by a severe outbreak of the bacterial parasite Xanthomonas uredovorus which attacks the uredo sori.

G.R. Bates

(continued from p. 40)

Professor P.M.S. Blackett has been appointed pro-rector of Imperial College of Science and Technology, London, from 1 October 1961.

Dr. K. Mellanby, head of the Entomological Department, Rothamsted, will become director of the new Monk's Wood Experimental Station of the Nature Conservancy on 1 October 1961. He will be succeeded at Rothamsted by Dr. C.G. Johnson.

Royal Society

Among new Fellows recently announced are Professor Irene Manton, professor of botany at the University of Leeds, and Dr. S. Siddiqui, director of the Pakistan Council for Scientific and Industrial Research, Karachi.

Royal Society of Edinburgh

Newly elected Fellows include M. Campbell, secretary, Department of Agriculture, and Fisheries for Scotland; K.B. Fraser, senior lecturer in Botany, and Professor J.R. Raeburn, professor of Agriculture, University of Aberdeen.

Society for General Microbiology

Officers for 1961-62 include: President: Professor R. Lovell, Treasurer: Professor K.E. Cooper, General Secretary: Dr. S.T. Cowan. The subject for the 1962 Symposium has been chosen as "Microbial classification".

Linnean Society

Dr. Franz Petrak of Austria, compiler of the well-known lists of fungi published by C.M.I., has been elected a Foreign Member.

The following have been elected for the 1961-62 session:
President: Professor T. Maxwell Harris; Treasurer: The Earl of Cranbrook, Secretaries: Dr. C.R. Metcalfe (botany), Dr. H.G. Vevers (zoology), Dr. John Smart (editorial). New members of Council: P.R. Bell, J.B. Gillett, Professor Tom Harris, Dr. D.M. Kermack, Dr. Sydney Smith.

Awards

The Royal Agricultural Society of England have awarded the research medal for 1961 to Dr. R. Hull, head of the Rothamsted field station, Dunholme, for his work on sugar beet diseases.

E.W. Mason, formerly chief mycologist at the Commonwealth Mycological Institute, Kew, has been awarded a Gold Medal of the Linnean Society.

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